In the Specification

Please amend paragraphs [0034] through [0045] as follows:

[0034] Referring now to Fig. 6, a cross-section of a portion of scintillator array is illustrated. As previously discussed, scintillator array 56 includes a plurality of uniformly spaced scintillators 57. Interstitially spaced or disposed between adjacent scintillators 57 is a reflector ~~84~~83. The reflector 83 is designed to maintain a relatively high light output for each scintillator 57 as well as prevent light and x-ray cross-talk between scintillators 57. In this regard, each reflector ~~84~~83 is composed, in one embodiment, of three layers. Specifically, a composite layer 86 is sandwiched between a pair of reflective layers 88. Preferably, the composite layers 86 are formed of a high atomic number metal and a low viscosity polymer. Examples of possible applicable high-Z metals include tungsten, tantalum, or other heavy metals which in powder form have a density greater than $16 g/cm^3$. Any of a number of low viscosity commercially available epoxies, such polyurethane, may be used as the polymer component of the composite layers. While it is preferred that the polymer be dark in color to improve performance of the scintillator array, it is contemplated that lighter polymers may be used. That is, there is no color requirement for the polymer material. Additionally, it is preferred that the polymer be fabricated from a material that has a relatively high resistance to radiation.

[0035] In one preferred embodiment, the thickness of the metal composite layer 86 is approximately 50 – 100 μm. In contrast, each reflective layer 88 preferably has a thickness of approximately 15 – 50 μm. The metal composite layers 86 are designed to absorb light that is transmitted from one scintillator to an adjacent scintillator thereby reducing, if not eliminating, optical cross-talk between the scintillators. Additionally, the metal composite layers are configured to absorb x-ray photons translating between scintillators. The amount as well as type of materials used in the metal composite layers defines the light as well as x-ray stopping power. However, one particular composite has been shown to absorb up to 50% of the x-ray photons between scintillators thereby reducing x-ray cross-talk by 50%. Given that optical cross-talk is typically 45% and x-ray cross-talk is typically 55% of the total cross-talk, with this exemplary composition and in accordance with the present invention, the total cross-talk of the scintillator array would be reduced by approximately 20% to 30% versus a conventional reflector. Additionally, the metal composite layer greatly reduces x-ray punch-through, e.g. by 60% or more.

[0036] Still referring to Fig. 6, reflector layers 88 are formed from an epoxy loaded with titanium dioxide (TiO_2). The reflector layers 88 are generally opaque and are designed to prevent light emissions from each of the scintillators 57. That is, the reflector layers 88 operate to confine the light generated by each of the scintillators 57 to be within the respective scintillators 57. As such, light, ideally, is not transferred between adjacent scintillators 57. Since a photodiode is designed to detect light emissions from each of the scintillators 57, the reflector layers 88 are used to improve the convergence of light toward the photodiode and the metal composite layer 86 reduces x-ray cross-talk between adjacent scintillators 57. To further improve light collection efficiency, a reflector top coat or layer ~~91~~90 is cast or otherwise deposited on the x-ray receptor surfaces or faces 92 of the scintillators 57 Coating 90 is designed to re-direct light emissions without affecting x-ray passage.

[0037] Referring now to Fig. 7, stages of a manufacturing technique in accordance with the present invention will be described in greater detail. Stage A of the manufacturing technique begins with the formation of a scintillator substrate 94. The scintillator substrate 94 is comprised of one or more materials designed to illuminate and output light upon the reception of x-rays or other radiographic imaging energy. The substrate 94 may be fabricated in accordance with one of a number of well-known semiconductor fabrication techniques. Stage A further includes grounding of the bulk substrate material into a wafer having a desired thickness as well as grinding or other processes to dimensionally define the substrate.

[0038] In Stage B of the manufacturing technique, the substrate 94 undergoes one of a number of pixelating processes to define a number of scintillators 57 in the substrate 94. For example, the substrate 94 may be diced using a wire saw dicer or other dicing mechanism. Additionally, the individual scintillators 57 may be defined using ion beam milling, chemical etching, vapor deposition, or any of other well-known substrate cutting techniques. Preferably, the individual scintillators 57 are defined such that a gap 96 is formed between adjacent scintillators. Additionally, the scintillators 57 are preferably defined two-dimensionally across the scintillator substrate 94. Preferably, gaps 96 extend between individual scintillators 57 in both the x and z directions and have a width of approximately 100 to 200 μm depending on the requirement of geometric dose efficiency. The depth of the gaps depends on the stopping power desired and varies according to scintillator substrate composition.

[0039] Following formation or definition of the individual scintillators 57, a highly reflective material ~~90~~89 is preferably cast onto the scintillators 57 and into the gaps 96 defined therebetween in Stage C. In one preferred embodiment, the cast filler 89 contains approximately 40% to 70% by weight titanium dioxide. However, one skilled in the art will appreciate that the cast filler 89 is not limited to an epoxy having titanium dioxide. Other highly reflective materials such as Ta_2O_5, HfO_2, Bi_2O_3, and PbO, as well as other similar materials may also be used. While these materials typically do not have a reflectivity characteristic as high as titanium dioxide, these materials do have sufficient x-ray stopping power characteristics that assist in the reduction of x-ray cross-talk between scintillators. Moreover, one skilled in the art will appreciate that casting defines one particular means by which reflector material may be disposed between the scintillators. As such, the present invention contemplates other deposition processes including injection molding, for example.

[0040] Preferably, the highly reflective material 89 takes the form of a powder and is cast in gaps 96. As such, the powder is cured for a prescribed period. After curing, the top surface or portion of the scintillator array is machined to leave a top reflective layer ~~91~~90 that has a desired thickness, e.g. 200 µm thick.

[0041] In Stage D, new gaps or channels 98 are created between scintillators 57 in the reflective material 89. Preferably, gaps 98 are created along both the x and z directions. Gaps 98 may be created using one of a number of cutting or dicing techniques as well as chemically-based etching processes. For example, gaps 98 may be formed using a wire saw or machining laser. Chemical etching, ion beam milling, as well as other semiconductor fabrication processes may also be implemented. In the example of a laser, a ND:YAG laser, CO_2 laser, or an AR^+ laser, or semiconductor laser may be used. In this example, the laser beam is focused on the center or middle of the reflective material disposed between the scintillators 57 and the width of the cut is adjusted so that a desired gap or channel width 98 results following the cutting process.

[0042] Wire saw dicing may also be used to machine gaps 98 in the reflective material 89 disposed between scintillators 57. For example, a wire having a diameter of 70 µm or less may be used to cut the desired gaps 98. In this regard, the wires are positioned on a spool (not shown) with a desired pitch. A mechanical fixture is then used to accurately position the wires and spool.

It is contemplated that at least two different types of wires may be used. That is, a metal wire with grinding media slurry feeding with the wires may be used. In this regard, the wires pass through the reflective material 89 and create the desired gaps. The grinding media may be diamond, SiC powder, alumina, and other well-known grinding media material. Preferably, the grinding media power has a grid size of 1,000 to 3,000 mesh. Another possible solution is to use a metal wire embedded with diamond or SiC media. OD (Outer Diameter) dicing saw may also be used. Regardless of the method, means, and mechanism to generate gaps 98, in a preferred embodiment, the thickness of the resulting reflective coating on the surface of each scintillator is approximately 15 to 50 μm.

[0043] Following formation of gaps 98 in the reflective material 89 between scintillators 57 so as to form a pair of separated reflective layers 88, a metal powder composite 86 is deposited into each gap 98 during Stage E. Preferably, the metal powder composite includes a high-Z metal such as tungsten or tantalum and is selected because of its high x-ray stopping power. Preferably, the metal powder of metal powder composite 86 has particular size of 0.5 to 5 μm. A low viscosity polymer such as epoxy, EpoTek® 301, polyurethane, or other low viscosity polymer is selected as a binder for metal powder composite 86. EPOTEK is a registered trademark of Epoxy Technology Inc. of Billerica, Massachusetts. In this regard, 40% to 60% by volume of the metal powder is preferably homogeneously mixed with a liquid polymer. The mixture or composition 86 is then cast into gaps 98 created in the reflective material 89 of reflective layers 88. After casting, the mixture 86 is allowed to cure.

[0044] One skilled in the art will appreciate that other methods or techniques may be used to deposit the metal layer composition 86 between pairs of reflective layers 88. For instance, the high-Z metal particulars may be coated with an adhesive binder material such as a thermoplastic polymer coating. The coated metal particulars would then be cast into the gaps 98 with a small amount of solvent such as alcohol. The solvent may then be vaporized whereupon the resultant material is heated to melt the thermoplastic coating that will bind all the particulars together as well as serve as an adhesive between scintillators 57. Another method includes coating the high-Z particles with tungsten or with low temperature solder film. The solder film is then melted after being cast into the gap. After the film is formed, the scintillator array is ground or milled on the top surface to remove extra material of the metal composite and reflective material. Preferably,

the top reflector ~~91~~90 has a thickness of approximately 50 to 200 μm to maximize light output while minimizing x-ray attenuation.

[0045] Once the metal composite layer 86 interstitially disposed between pairs of reflective layers 88 is allowed to cure, the scintillator array is then machined at Stage F into a final and desired dimension. Additionally, the bottom surface 99 of the scintillator substrate is machined or ground to remove extra scintillator material and to attain a final and desired thickness. For example, depending on the type of scintillator being fabricated, the final thickness ranges from approximately 1.5 to 3 mm. The machined surface may then be optically coupled to a photodiode in accordance with well-known CT detector fabrication assembly.